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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/791,049

03/02/2004

Xiaorong Wang

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EXAMINER

ASINOVSKY, OLGA

ART UNIT

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1796

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/791,049	Applicant(s) WANG ET AL.	
	Examiner OLGA ASINOVSKY	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) 1-9, 18-22, 32 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-17, 23-25, 27-31, 34 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>05/02/08;03/14/08;01/22/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicants present new independent claim 32 and new claims 33-35.

The cancellation of claim 26 is noted.

1. Newly submitted independent claim 32 and dependent claim 33 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 32 drawn to a crosslinked core-shell nanoparticle comprising: (i) a diblock copolymer chains comprising a core/shell structure and (ii) monoblock polymer chains, wherein the core segment comprises diblock copolymer chains and monoblock polymer chains, and the shell segment comprises the shell monomer units of the diblock copolymer chains. The core/shell nanoparticles structure is different from the elected invention. The invention of claims 10-17, 24-25, 27-31, 34-35 and an invention in claims 32-33 requires a new restriction. Inventions are unrelated if it can be shown that they are not disclosed as capable of use together and they have different designs, modes of operation, and effects (MPEP § 802.01 and § 806.06). In the instant case, the different inventions the different inventions have different designs, functions and different effect.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 32-33 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 10-17, 23-25, 27-31 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krom et al U.S. Patent 6,437,050 or EP 0 265 142 each in view of Wang U.S. Patent 6,737,486.

Krom discloses a micelle structure having nano-particles size of less than about 100 nanometer, column 1, line 44. The polymer nano-particle composition has a poly(alkenylbenzene) core=inner layer and a surface layer=outer layer including poly(conjugated diene), column 2, lines 3-67. The nano-particle polymer is in the form of a core/shell structure, claim 1 at column 9. A core of polyalkenylbenzene is readable for being an inner layer in the present claims. A surface layer derived from polymerizing conjugated diene is readable for being an outer layer in the present claims. A polymeric composition can be crosslinked, claim 4 at column 9, by a crosslinking agent such as divinylbenzene. The nano-article polymer can be in the form of a diblock copolymer produced by living anionic polymerization process, column 2, lines 51-65. A chemical formulation of the claimed mono-block polymer and chemical formulation of a diblock polymer in the present claim 10 is open to any monomer recited in part (a). Krom discloses that "after the micelles have formed, additional conjugated diene monomer and/or vinyl-substituted aromatic hydrocarbon monomer can be added to the

polymerization mixture as desired,” column 3, lines 16-18. Since the living/active polymer chain is not terminated after the micelles formation, the desired mono-block polymer is produced by adding desired monomer. The formation of mono-block polymer chain is readable in the living anionic polymerization process condition in Krom invention. Krom does not use term “polymodal” or “bimodal,” or “trimodal.” However, the broad range limitation of the molecular weight from 5,000 to 200,000 is evidence that the polymer nanoparticles chains have broad size distribution. The present claim 10 claims size distribution between about 1 nm and 1000 nm. The nanoparticles having claimed size distribution is readable in Krom invention. Krom discloses a polydispersity index less than about 1.3, column 2, lines 14-15.

Krom does not disclose claimed polydispersity index between about 1.5 and 10 in the amended claim 10 and the new claim 26.

EP' 142 discloses a core/shell polymer composition having a nano-particle size morphology. The rubbery core polymer is formed from a polybutadiene by emulsion polymerization technique and than can be agglomerated to a large particle size to control the particle size, page 5. The core polymer can be crosslinked in the presence of divinylbenzene (DVB), page 3, lines 47 and 51. The shell polymer is formed by polymerizing vinylaromatic monomer. EP'142 discloses anionically polymerizing styrene and butadiene to form block copolymer, page 2, line 33. An outer shell is grafted onto the agglomerated core polymer, page 5, lines 45-49 and page 6, line 55. The core-to-

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shell ratio is preferably from about 60:40, page 4. The particle diameter size is about 250 nm, page 4, line 21.

EP'142 does not disclose claimed polydispersity index between about 1.5 and 10 in the present claims.

Wang discloses a living polymerization of alkenes for obtaining polymers with controlled structure, column 5, lines 30-34. The process condition for manufacturing nanocomposites comprising polymer and layered material produced by living polymerization process, column 5, lines 1-3, for producing controllable polymeric products having desired structures and architectures, column 5, lines 16-21; column 4, lines 59-67; column 1, lines 51-60; column 11, lines 24-46 and column 12, lines 33-63. The ratio of M_w/M_n is less than 10, preferably less than 2, column 5, line 47. Wang'486 discloses a living polymerization process for a wide variety of readily available starting materials and catalysts, column 4, lines 65-67, wherein the desired M_w/M_n is depending on the selected initiator system, column 5, line 54 through column 12.

All cited references disclose a living polymerization process for obtaining nanocomposites having desired structure such as graft copolymer, core/shell copolymer, block copolymer or multi-layer composite.

Wang'486 discloses the claimed polydispersity index (M_w/M_n) in the range of 1.5 to 10, wherein the desired M_w/M_n is depending on the selected initiator system and controlling

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process condition such that the initiating system has a benefit to control the polymeric structure and complex polymeric architecture, column 6, lines 1-18.

It would have been obvious to one of ordinary skill in the art at the time of invention to use the polymerization process condition by teaching in Wang'486 invention for producing desired structure of nanocomposite material in Krom or EP'142 having desired polydispersity index in the range of 1.5 to 10, because all references disclose the anionic living polymerization process condition for producing desired nano-particle composition having desired nano-particles size limitation, and there is no showing of unexpected results derived from said use in Krom or EP'142 invention.

It would have been obvious to one of ordinary skill in the art to control the polymerization condition in Krom and EP'142 such that the ratio of second monomer units to first monomer units greater than 1:1 for claim 10 or a ratio of said first monomer units to said second monomer units is between 0.1:1 and 0.8:1 for the present claim 24, since the charge of the selected monomer and the amount of said monomer are depending on the desired physical properties of the outer layer and inner layer, and these conditions are readable in the invention of Krom and EP'142, because the each reference discloses controlled polymerization process condition, and the selected monomer for obtained the outer layer in the present claims is not critical referring to first monomer units selected from the group consisting of alkenylbenzenes, conjugated dienes, alkylenes, and mixtures thereof.

Response to Arguments

4. Applicant's arguments filed 02/28/2008 have been fully considered but they are not persuasive. The argument is that Krom does not disclose the formation of mono-block polymer chain, referring to column 3, lines 16-19. Applicants argue that Krom discloses increasing the size of the nanoparticles, this argument is not persuasive. Krom discloses that "after the micelles have formed, additional conjugated diene monomer and/or vinyl-substituted aromatic hydrocarbon monomer can be added to the polymerization mixture as desired," column 3, lines 16-18. Since the living/active polymer chain is not terminated after the micelles formation, the desired mono-block polymer is produced by adding desired monomer. The formation of mono-block polymer chain is readable in the living anionic polymerization process condition in Krom invention. Krom does not mention to increase nanoparticles size. The broad range limitation of the molecular weight from 5,000 to 200,000 is evidence that the polymer nanoparticles chains have broad size distribution in Krom invention. The present claim 10 claims size distribution between about 1 nm and 1000 nm. Krom discloses a polydispersity index less than about 1.3, column 2, lines 14-15.

5. In response to applicant's argument that Wang'486 is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Wang discloses a living polymerization of alkenes for obtaining polymers with

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controlled structure. Wang discloses a method for living polymerization of vinyl monomers and controllable polymeric product (abstract). The ratio of Mw/Mn is less than 10, column 5, lines 47-48. Any method for producing nanoparticle composition can be used in the present claimed invention. A multi-layer composite, core/shell copolymer or graft copolymer having an outer layer and an inner layer is readable in the present claims.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. References have been considered.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Olga Asinovsky whose telephone number is 571-272-1066. The examiner can normally be reached on 9:00 to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on 571-272-1302. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

O.A.

Olga Asinovsky
Examiner
Art Unit 1796

May 18, 2008

/Randy Gulakowski/
Supervisory Patent Examiner, Art Unit 1796

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